ENGEL, T. (1993): Simulationsmodelle zur Stickstoffdynamik, Analyse und Vergleich. Agrarinformatik, Band 25. Ulmer Verlag, Stuttgart, Germany

ENGELS, T. (1993): Nitratauswaschung aus Getreide- und Zuckerrübenflächen bei unterschiedlichem N-Angebot. Ph.D. thesis, University of Hannover, Germany

Enquete-Kommission "Schutz der Erdatmosphäre" des Deutschen Bundestages (Ed.) (1994): Schutz der Grünen Erde. Economica Verlag, Bonn, Germany

ERISMAN, J.W. (1999): personal communication

GRANLI, T.; BØCKMAN, O.C. (1994): Nitrous Oxide from agriculture, Norwegian Journal of Agricultural Science, Supplement No. 12 1994. Agricultural University of Norway – Advisory Service, As, Norway

HORLACHER, D.; MARSCHNER, H. (1990): Schätzrahmen zur Beurteilung von Ammoniakverlusten nach Ausbringung von Rinderflüssigmist. Z. Pflanzenernähr. Bodenk. 153, 107-115

HOUGHTON, J.T. et al. (Ed.) (1997): Greenhouse Gas Inventory Reporting Instructions, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volumes 1-3. The intergovernmental Panel on Climate Change (IPCC), London, United Kingdom

Hydro Agri Dülmen GmbH (Ed.) (1993): Faustzahlen für Landwirtschaft und Gartenbau. Landwirtschaftsverlag GmbH, Münster, Germany

ISERMANN, K. (1990): Ammoniakemissionen der Landwirtschaft als Bestandteil ihrer Stickstoffbilanz und hinreichende Lösungsansätze zur Minderung. Bundesforschungsanstalt für Landwirtschaft (FAL), Braunschweig, Germany

JOL, A.; KIELLAND, G. (Ed.) (1997): Air Pollution in Europe 1997. European Environment Agency (EEA), Copenhagen, Denmark

KAISER, E.-A. et al. (1996): What predicts nitrous oxide emissions and denitrification N-loss from European soils?. Z. Pflanzenernähr. Bodenk. 159, 541-547

KROEZE, C. (1994): Nitrous Oxide (N_2O) – emission inventory and options for control in the Netherlands. RIVM Report nr. 773001004. National Institute of Public Health and Environmental Protection (RIVM), Bilthoven, Netherlands

KUSTERS J.; JENSSEN T. (1998): Selecting the right fertilizer from an environmental life cycle perspective. IFA 1998 Technical Conference, Marrakech, Morocco. International Fertilizer Industry Association (IFA), Paris, France

LOGES, R.; WACHENDORF, M.; TAUBE, F. (2000): Scaling up of milk production data from field plot to regional farm level. Proceedings of the 2nd European Invitational Expert Seminar on Life Cycle Assessments of Food Products, The Hague, January 25-26, 1999. Agricultural Economics Research Institute (LEI-DLO), The Hague, Netherlands

SCHEFFER, B.; ORTSEIFEN, U. (1996): Abschätzung der Nitratausträge aus der durchwurzelten Bodenzone am Beispiel der Böden Niedersachsens. Endbericht zum F+E-Vorhaben. Niedersächsisches Landesamt für Bodenforschung, Bremen, Germany

SOMMER, S.G. (1992): Ammonia volatilization from cattle and pig slurry during storage and after application in the field. Ph.D. thesis, University of Copenhagen, Denmark

STANNERS, D.; BOURDEAU, P. (Ed.) (1995): Europe's Environment – The Dobris Assessment. European Environment Agency (EEA), Copenhagen, Denmark

Umweltbundesamt (Ed.) (1997): Daten zur Umwelt. Der Zustand der Umwelt in Deutschland. Ausgabe 1997. Erich Schmitt Verlag, Berlin, Germany

VON RHEINBABEN, W. (1990): Nitrogen losses from agricultural soils through denitrification – a critical evaluation. Z. Pflanzenernähr. Bodenk. 153, 157-166

WIESLER, F. (1999): Comparative Assessment of the Efficacy of Various Nitrogen Fertilizers. in: Rengel, Z. (1999): Nutrient Use in Crop Production. The Haworth Press Inc., Binghamton, USA, pp. 81-114

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1st Int. Conference on Tribology in Environmental Design (TED), 4-6 September 2000

The focus of TED2000, which was organised by the Sustainable Product Engineering University Research Centre within Bournemouth University of the UK, was to bridge the gap between the well-studied scientific discipline of tribology and environmental design. Professor H Peter Jost (known by many as being the *Father of Tribology*) described this event as a courageous achievement in raising awareness on the importance that this engineering discipline maintains on the challenges of today.

Throughout the three days of the conference 34 contributions were presented to 50 people from 15 different countries. During his opening address, Sir Gordon Higginson emphasised that these statistics alone made this first event a success when compared to previous tribology events.

Other opening addresses came from Mr. Gordon Waddington, Research and Technology, Rolls-Royce plc of the UK and Professor Stathis Ioannides, SKF Group Technical Development of The Netherlands. Both addresses presented an industrial perspective towards the general scope of the conference. Mr. Waddington emphasised the importance the research topics discussed during TED2000 have to Rolls-Royce. Similarly, Professor Ioannides elaborated on the importance SKF, the largest rolling element manufacturer, sees between tribology and the environment. SKF manufactures 60 billion steel bearings per annum weighing in excess of 4.5 tonnes. Since 1981, SKF managed to half the weight of each bearing saving approximately 90 gigawatts of process electrical energy.

The **first day** of the conference focused on how to handle wear data and re-use this data as knowledge towards the design of *Life-oriented Products* using *Product Life Design Tools*. Throughout this day an emphasis as to how to address the environment and yet satisfy tribological constraints was highlighted. Frameworks to utilise wear information during the product development phase or in the development of disassembly-friendly products were presented. Finally, studies on *Life-cycle Assessment for Optimised Products* were presented to characterise the implications tribological issues have during the whole product life cycle.

The **second** and the **third day** of the conference focused primarily on the measurements of wear, cutting processes, materials, etc. The topics covered included *Surface Engineering*, *Lubricants*, *Test Methods*, *Advanced Materials* and *Analytical Studies*. Coatings and their applications were discussed and how these may be used to address environmental criteria. Test methods to improve product lifetime or the manufacturability of components were discussed. Advanced materials such as metal composites, silicon nitride and thermoplastics were evaluated and their performance assessed.

The conference was brought to a close by Professor John Tripp of SKF who emphasised that in order to support *Green Things* the slogan *Conserve Energy* must change to *Conserve Entropy*. He emphasised that the principal difference between the two is that the former is a must, anything different would violate the First law of Thermodynamics. The latter, on the other hand, is in accordance with the Second Law of Thermodynamics and characterises the performance of thermal processes and heat engines. To ensure the conservation of entropy industry must *listen* to tribologists, who are constantly dealing with the phenomena of surfaces at nano-scale, micro-scale and contact phenomena.

The enthusiastic comments received throughout the three days led the organisers to believe that TED events may fulfil the tasks they set out to achieve and gain acceptance in the scientific fields of tribology and design.

We look forward to the next conference in Malta.

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